VI.5.3B   OPERATIONAL FORECAST PROGRAM HYDROLOGIC COMMAND LANGUAGE
          (HCL) INPUT EXAMPLES

Introduction

This Section contains sample Hydrologic Command Language (HCL) input
for a variety of typical runs of the Operational Forecast Program
(FCST).

The examples not only illustrate the HCL input for typical runs but
also show various ways in which the FCST program can be used.

The examples are primarily intended to show runs involving the use of
more than one Function and illustrate the relationship between
Functions. Examples of the input for single Function runs are given
under each Function in Section VI.5.3C [Hyperlink].

In all of the examples it is assumed that no Local HCL defaults have
been set except that the output time zone (NOUTZ) and daylight
savings switch (NOUTDS) Techniques are assumed to be set to meet the
user's requirements. In reality the user would set default values to
meet other Local requirements and reduce the HCL input.

Examples

Example 1. Preprocessors for entire user area

This example shows the HCL input for a run of all the preprocessors
for the entire user area. Two days of observed data are included
(most recent day plus the inclusion of late observations from the
previous day), but only the most recent day is displayed. Five days
of future MAPX, MAT, MAPE and RRS time series values are produced.
No future MAP values are generated. The MAP Function uses a
convective radius of 20 miles to limit the search for point
estimators and uses MDR data to time distribute daily MAP estimates
into 6 hour values. The last date with observed data defaults to
today at 12Z. The following results are displayed: observed and
estimated non-zero daily precipitation, all 6 hour precipitation, MDR
data, observed temperature data, PE station data and all RRS
observations. There are 2 Carryover Groups that require MAP
computations.

     @SETOPTIONS
      STARTRUN *-02
      ENDRUN   *+05
      PRLASTDY
      CGROUP USERCG1
      CONVEC 20.
      MDRDIST
      PRTPP24(2)
      PRTPP6
      PRTMDR
      PRTTINST
      PRTT24

```
    STNPE(2)
    RRSALLOB
   @COMPUTE MAP
   @SETOPTIONS
    CGROUP  USERCG2
    PRTPP24(0)
    PRTPP6(0)
    PRTMDR(0)
   @COMPUTE MAP
   @COMPUTE MAPX
   @COMPUTE MAT
   @COMPUTE MAPE
   @COMPUTE RRS
   @STOP
```

If the preprocessors were to be executed routinely in this manner then an HCL Procedure could be created to simplify the input even further. Since the use of the convective radius option would change depending on storm type then the CONVEC Technique would be left out of the Procedure. Thus if an HCL Procedure named ALLPP was created then the same run as above could be made by entering:

```
   @SETOPTIONS
    CONVEC 20.
   @EXECUTE ALLPP
```

Example 2. Forecast Group run

This example shows the HCL input for a run of a single Forecast Group. First the MAP Function is run for the Forecast Group to update the MAP time series based on precipitation reports that have been received since MAP was last run. The MAP Function always estimates missing station data for the entire user area, but MAP time series will only be computed for the area specified. The other preprocessors are always run for the entire area and could be added to this example if needed. For the MAP Function, the options used are: the Tulsa data estimation method, MDR used to fill in zero amounts, 6 hour stations to determine time distribution and displays of the daily and 6 hour data.

For the Forecast Function (FCEXEC) several runtime modifications are entered to modify the runoff, discharges and model variables. If this Forecast Group is downstream of other Forecast Groups, the upstream inflows are obtained from the most recent runs of these upstream areas.

In this example it is assumed that observed data are available through 0Z of the current day (i.e. this is an evening forecast run). MAP is only run for the latest 12 hours, whereas FCEXEC starts 2 days ago. The MAP output will be on unit 8, whereas FCEXEC output will be on unit 6.

```
   @SETOPTIONS
    LSTCMPDY *00Z
    STARTRUN *
    FGROUP BASINX
```

```
    ESTTULSA
    MDREST24(1)
    PRTPP24(2)
    PRTPP6
    PPPRINT(8)
   @COMPUTE MAP
   @SETOPTIONS
    STARTRUN *-02
    ENDRUN *+05
    MOD
     .ROCHNG 030118Z
     SEG1  .4  .2  0  .8
     SEG2  0  .4  1.2
     .TSCHNG 0229 0302
     SEGUP FPX QINE 6 400 800 1000 1500 2000 1700 1500
     SEGX FPY STG 12 12.4 15 18
     .WECHNG 0301
     SEGD  6.7
     SEGM  8.1
     SEGB  4.7
     .UHGCHNG  0302
     SEG10  0 2 7 10 7 4 2 1 / UP
     SEG10  4 8 7 5 3 1 / DOWN
     ENDMOD
   @COMPUTE FCEXEC
   @STOP
```

Actual, rather than relative, dates are required for MODS so that if
the MOD cards are left in the HCL input stream on subsequent runs,
the MODS will only apply to the periods for which they were intended.

A generalized HCL Procedure also could be defined for use with any
Forecast Group through the use of symbolic parameters in the
Procedure definition. The default values of the symbolic parameters
are assigned when the Procedure is defined. These values then can be
changed at run time. An example of the definition of such a
Procedure is as follows:

```
   @DEFINEL PROCEDURE FGRUN
    PXEST=CONVEC
    MDRUSE=N
    MDRLMT=0
    FGROUP=DUMMY
    STARTMAP=*-01
    STARTFC=*-02
    LASTOB=*
    @SETOPTIONS
     LSTCMPDY &LASTOB
     STARTRUN &STARTMAP
     FGROUP &FGROUP
     &PXEST
     MDREST24(&MDRUSE) &MDRLMT
     PRTPP24(2)
     PRTPP6
     PPPRINT(8)
    @COMPUTE MAP
```

```
   @SETOPTIONS
     STARTRUN &STARTFC
     ENDRUN *+05
   @COMPUTE FCEXEC
    @STOP
   END
```

The partial area run for Forecast Group BASINX shown at the beginning
of this example can be executed using the generalized FGRUN Procedure
with the following input:

```
   @SETOPTIONS
     MOD
     All MODS in effect
     ENDMOD
   @EXECUTE FGRUN LASTOB=*00Z STARTMAP=* FGROUP=BASINX
     PXEXT=ESTTULSA MDRUSE=Y STARTFC=*-01
```

Example 3. Save carryover run

Carryover can be saved only when an FCEXEC Carryover Group run is
made. Normally a carryover save run is made after all the data are
posted and processed and all adjustments (MODS) are determined
(sometimes referred to as the 'final' run of the day). A carryover
save run will take longer to complete than a CGROUP run where
carryover is not saved due to the extra computations and disk
accesses required.

In the example, the run starts 2 days ago so that any late data from
the previous day is included in the carryover values. Carryover is
saved for today, but carryover for yesterday, if available, will be
automatically updated. No future data are included since these data
do not affect today's carryover. The MODS that are currently in
effect are stored by Forecast Group names in files. All FCEXEC
printout (hydrograph displays, etc.) is turned off. In addition to
the FCEXEC Function, two other Functions are included in this
example. The CGSTATUS Function displays a table showing which dates
carryover is available and the PRINTOPS Function displays a summary
of current conditions for the snow and Sacramento models.

```
   @SETOPTIONS
     CGROUP USERGG
     STARTRUN *-02
     ENDRUN *
     SAVETDY
     PRINTOUT(0)
     MOD
       .INCLUDE BASINA
       .INCLUDE BASINB
       .INCLUDE BASINC
       .INCLUDE BASIND
      ENDMOD
   @COMPUTE FCEXEC
   @COMPUTE CGSTATUS
   @SETOPTIONS
     PRNTCGRP USERCG
```

```
      PRNTLAST 1
      PRNTOPER SNOW-17 SAC-SMA
   @COMPUTE PRINTOPS
   @STOP
```

An HCL Procedure could be created from these instructions, named
FINAL for example, to reduce the HCL input. The input for the
carryover save run would then become:

```
   @EXECUTE FINAL
```


Example 4 - QPF or contingency run

No future precipitation data were used in the previous examples.
This example shows a run where future MAP data are input and
translated into time series by the FMAP Function. The future MAP
time series are then used by the FCEXEC Function to generate QPF or
contingency forecasts at points of interest.

The HCL input could be:

```
   @SETOPTIONS
    LSTCMPDY *
    MOD
      .FMAP6  030318Z
      AREA17-AREA8 .5 2.0 1.0 0.5
      AREA6  01. 1.5 1. .5
      AREA29  0 .2 .5 2. 1. .5
      ENDMOD
   @EXECUTE QPFFPX
```

where the HCL Procedure contains the instructions to produce a run
using future precipitation for the river network above a certain flow
point. The Procedure QPFFPX contains:

```
   @SETOPTIONS
    FGROUP FPX
    INCLUDE QPFOPT
    PLOTHYD (FPX)
    PLOTHYD (FPM)
    PLOTHYD (FPZ)
   @COMPUTE FMAP
   @COMPUTE FCEXEC
   @SETOPTIONS
    FUTPRECP(0)
    PRINTOUT(0)
   @COMPUTE FCEXEC
   @STOP
```

The named option QPFOPT contains the QPF related options for FCEXEC
and the ENDRUN value for both FMAP and FCEXEC.

```
   STARTRUN *-01
   ENDRUN *+10
   FUTPRECP(1)
```

PLOTHYD(0)

In this example future MAP time series values are first input via the
.FMAP6 MOD to define the QPF pattern. The special Forecast Group FPX
is then run. This special Forecast Group contains the Segments
needed to produce a QPF forecast at point X, a point where QPF
forecasts are frequently requested. The QPFOPT named option sets the
run period, turns the future precipitation flag 'on' for the FCEXEC
Function and turns all hydrograph plots 'off'. Next hydrograph plots
are turned 'on' for only those points where a QPF forecast is needed.
After the QPF forecast is computed, the FCEXEC Function is run again
with future precipitation and printout 'off' in order to reset all
time series in the Processed Data Base back to their pre-QPF
condition. If this last step is not included then a subsequent
regular forecast run for a downstream FGROUP could use upstream
inflows stored in the Processed Datq Base that contain QPF generated
flows.